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Final Report on the Project  
to Develop HDH Host to  
C-30/IMP Protocol Software  
for Use with XQ/CP and UMC

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Final Report on the Project  
to Develop HDH Host to  
C-30/IMP Protocol Software  
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## BACKGROUND

ACC produces a plug-in microprocessor for the PDP-11 UNIBUS, referred to as the UMC, which has been programmed to operate as an X.25 controller (levels 1, 2, and 3). ACC has an I/O driver for this X.25 controller for use on the RSX-11M operating system.

ACC also produces a Multi-Channel Direct Memory Access (MDMA) controller for the LSI-11. The MDMA allows the attachment and servicing, the LSI-11, of subordinate interface cards. These are: an XQ/1822 board for ARPANET connection, and a pair of boards (XQ/NTDSI, XQ/NTDSO) for 32-bit NTDS operation. The new communication processor that was added to this group under contract, and was designated the XQ/CP.

ARPA has the requirement for operation of both the X.25 protocol and an HDLC type of connection on the LSI-11. ACC was contracted to develop a method for implementing an LSI-11 version of the UMC hardware. This LSI-11 based device was to be capable of operating with the software presently in use on the PDP-11 and UMC. To accomplish this, ACC adapted existing products to the requirement and implemented a working prototype of such a system for ARPANET use.

Independently, ACC implemented and introduced a new HDLC Host-to-IMP Line protocol for ARPA net application. Subsequently, under DARPA sponsorship, ACC was contracted to develop a version of this proprietary software for use with the XQ/CP as the new ARPA-HDH protocol interface.

## PROJECT EVENTS

1. Definition of Task Specification
2. Design and Implement Software
3. Test with LSI-11/23 and Controller
4. Test with UMC
5. Test with BBN Computer
6. Ship Documentation with Pre-Production Prototype
7. Complete Final Report

Documentation has been produced to support software generated under the contract. References identify both documents: Software Listing and User's Manual.

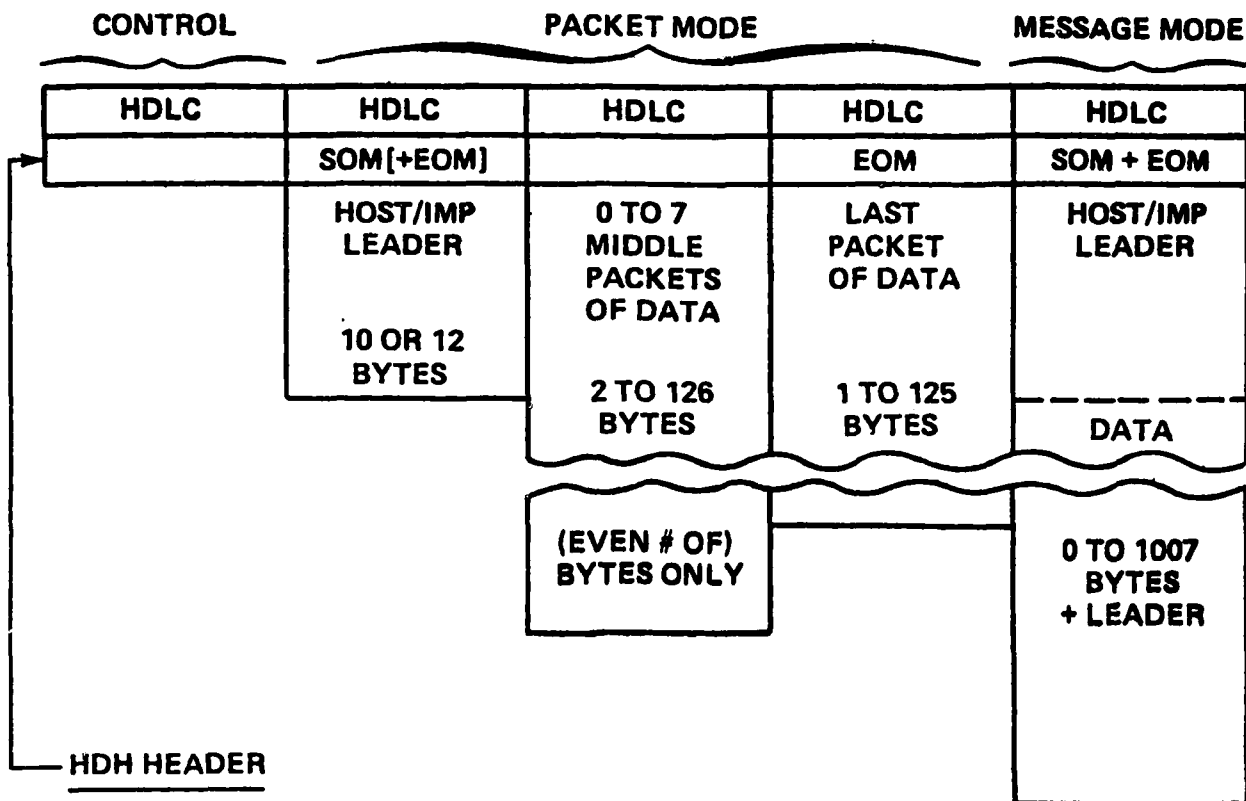
## DESIGN GUIDELINE

A new host interface, designated as HDH, has been designed and implemented on C/30 IMPs to support the connection of hosts to the IMP using HDLC at the link level, and the ARPANET host/IMP logical protocol at the network level. This access protocol will be general enough to permit any host with an HDLC capability to use the ARPANET Host/IMP protocol. The protocol is independent of the data transparency used on the link (bit- or byte-oriented), and of the type and size of the cyclic redundancy checksum (or FCS) although the standard HDH interface will use CCITT HDLC framing and FCS.

The HDH inserts a reliable transmission protocol underneath the standard ARPANET Host/IMP protocol. The HDH uses HDLC. Each frame also carries in addition to the HDLC header a two-byte HDH header. In order to accommodate both present and future requirements, the HDH protocol will have two modes, shown in the figure.

The design specification, which established protocol parameters, protocol insertion, header identification for control, and line control interaction between Host and IMP, was initially published in BBN Report 1822, Appendix J.

\* Per BBN Report No. 1822, Appendix J



FOR CONTROL:

1	1	1	1	2	10
1	SEQ	H/I	LIN	0	0
					LINE DOWN COUNTER

FOR PACKET/  
MESSAGE:

1	1	1	1	1	10
0	SEQ	H/I	SOM	EOM	0
					BYTES IN REST OF FRAME

SEQ = 1 IF SEQUENCE BREAK  
 H/I = 0 IF HOST ORIGINATED, 1 IF IMP ORIGINATED  
 LIN = 1 IF LINE IS UP, 0 IF LINE IS DOWN  
 SOM = 1 IF START OF MESSAGE  
 EOM = 1 IF END OF MESSAGE

## REFERENCES

1. HDH Host to C-30/IMP Software Listings for Both XQ/CP & UMC

Report Number ACC-52-001, available from:

Associated Computer Consultants  
720 Santa Barbara Street  
Santa Barbara, CA 93101

2. IF-11Q/HDH User's Manual

Report Number IF-11Q/HDH.UM.V001, available from:

Associated Computer Consultants  
720 Santa Barbara Street  
Santa Barbara, CA 93101

3. XQ/CP Maintenance Manual

Report Number XQ/CP.MM.004, available from:

Associated Computer Consultants  
720 Santa Barbara Street  
Santa Barbara, CA 93101

4. IF-11Q/HDLC User's Manual

Report Number IF-11Q/HDLC.UM.V001, available from:

Associated Computer Consultants  
720 Santa Barbara Street  
Santa Barbara, CA 93101

5. IF-11Q/X.25 User's Manual

Report Number IF-11Q/X.25.UM.V001, available from:

Associated Computer Consultants  
720 Santa Barbara Street  
Santa Barbara, CA 93101

6. Specification for Connecting a Host and an IMP

Report Number 1822, available from:

Bolt, Beranek, & Newman, Inc.  
50 Moulton Street  
Cambridge, MA 02138



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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) <b>This document provides a summary of the development of protocol software between HDH Host and C-30/IMP using XQCP controller for access from a LSI-11 Q bus.</b> <i>a</i>		